# Hydro-View / Hydro-Hub EtherNet/IP Configuration Guide

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# *Revision history*

| Revision No | Software Version | Date | Description of Change |
|---|---|---|---|
| 1.0.0 | | Sept 2020 | First release |
| 1.1.0 | | August 2021 | Updated Connection Diagrams |
| 1.2.0 | | July 2025 | DCR 7998 - Added IO mappings |
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# Chapter 1 Introduction

This guide details the installation and configuration of the optional Hydronix Hydro-Hub EtherNet/IP Module. The module enables EtherNet/IP communication between the Hydro-Hub/Hydro-View and a EtherNet/IP Scanner.

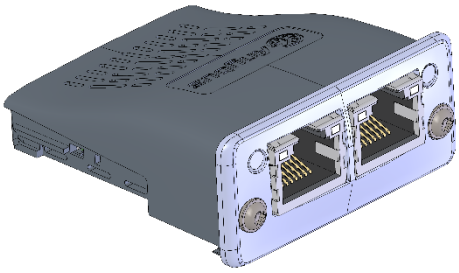

**Figure 1: Hydro-Hub EtherNet/IP Module**

Using the Hydronix EtherNet/IP module will provide direct access to any Hydronix Sensor connected to the Hydro-Hub/Hydro-View network from the PLC.

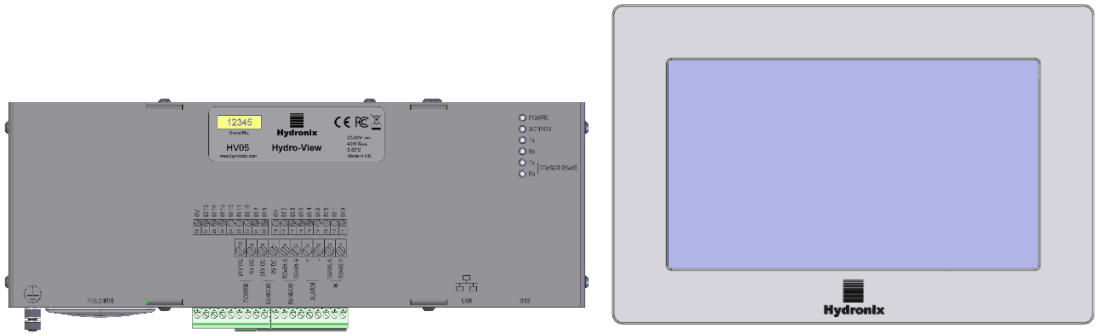


**Figure 2: Hydro-Hub (L), Hydro-View (R)**

Previous knowledge of EtherNet/IP, Allen-Bradley PLCs, Studio 5000 and RSLinx are required as this document is intended as a basic guide only.

For detailed Hydro-Hub/Hydro-View instructions see the Hydro-Hub/Hydro-View user guide HD0864

All references to a Hydro-Hub EtherNet/IP Module in the guide are valid for the Hydro-Hub and Hydro-View hardware. The electrical connections and configuration of the Hydro-Hub and Hydro-View are identical.

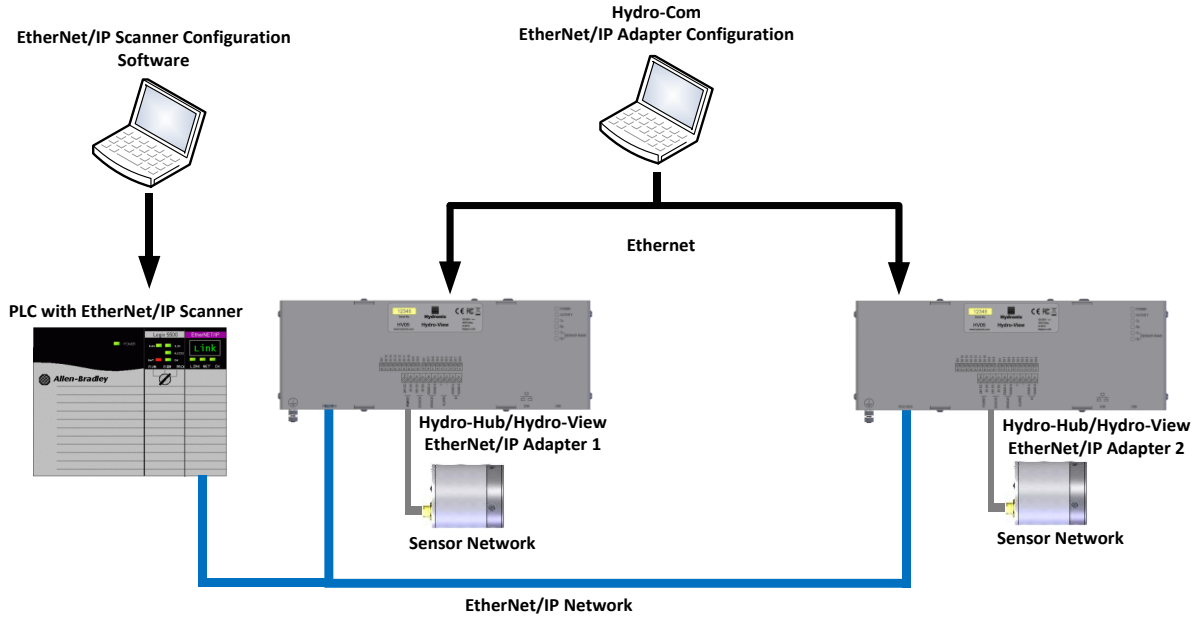


**Figure 3: System Overview**

# 1 Hydronix EtherNet/IP Module

To enable EtherNet/IP communication with the Hydro-Hub/Hydro-View the optional Hydronix EtherNet/IP Module must be installed.

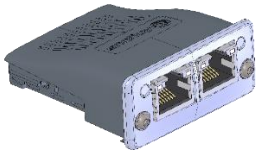

**Figure 4: EtherNet/IP Module**

1. Switch off the Hydro-Hub/Hydro-View
2. Remove the protection cover from the Hydro-Hub/Hydro-View

**Figure 5: Protection Cover**

3. Insert the Hydro-Hub EtherNet/IP Module as show in the Figure 6. Ensure the connector is correctly positioned.

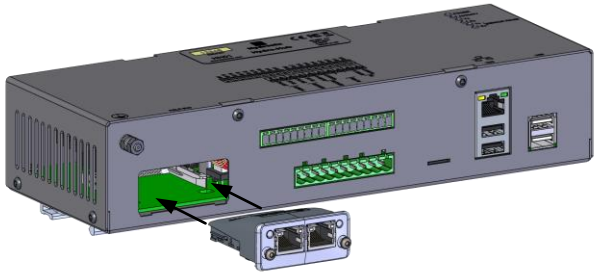

**Figure 6: Installing the Hydro-Hub EtherNet/IP Module**

4. Tighten the two anti-tamper screws.

**Figure 7: Hydro-Hub EtherNet/IP Module Installed**

# 2 Wiring

The Hydronix EtherNet/IP module supports Star and Ring topologies.

## 2.1 Star Topology

When using a Star topology, the PLC (controller) and all Hydronix EtherNet/IP Modules are connected to a central network switch.


**Figure 8: Star Topology**

## 2.2 Ring Topology

When using a ring topology, the PLC (controller) and all Hydronix EtherNet/IP Modules are connected in a ring


**Figure 9: Ring Topology**

***Note: To enable remote access to the Hydro-Hub/Hydro-View, the main ethernet communication port must also be connected to the network switch (connection not shown).***

## 2.3 Cables

The Hydronix EtherNet/IP Module utilises a RJ45 connector. Suitable cables are:

- Category 5
- Category 5e
- Category 6
- Category 6e

To avoid electrical interference all cabling must be run separately from any mains and motor cabling. A segregation of at least 200mm between the EtherNet/IP cabling and any high voltage/current wiring must be provided.

In situations where the 200mm segregation cannot be provided, for example when cables must cross, ensure they pass at 90° (never parallel).

In areas at risk of lightning strikes, protection should be provided to shield the EtherNet/IP module and the Hydro-View/Hydro-Hub from damage.

***Note: For additional EtherNet/IP cabling guidance see the appropriate EtherNet/IP standards documentation.***

***All wiring must be performed by persons holding the required qualifications for the local area.***

The only configuration required in the Hydro-Hub to enable EtherNet/IP communication is the Fieldbus Address. The Fieldbus address must be the fixed I.P address that is targeted by the Scanner initiating the Class 1 connection.

# 1 Configure the Hydro-Hub Fieldbus Address

Select Settings from the main menu (It is assumed for this step that a user has logged in as an engineer. See HD0864 for details)

**Figure 10: Hydro-Hub Settings**

Note the I.P address in the 'Field bus address' and type this in to a web browser.

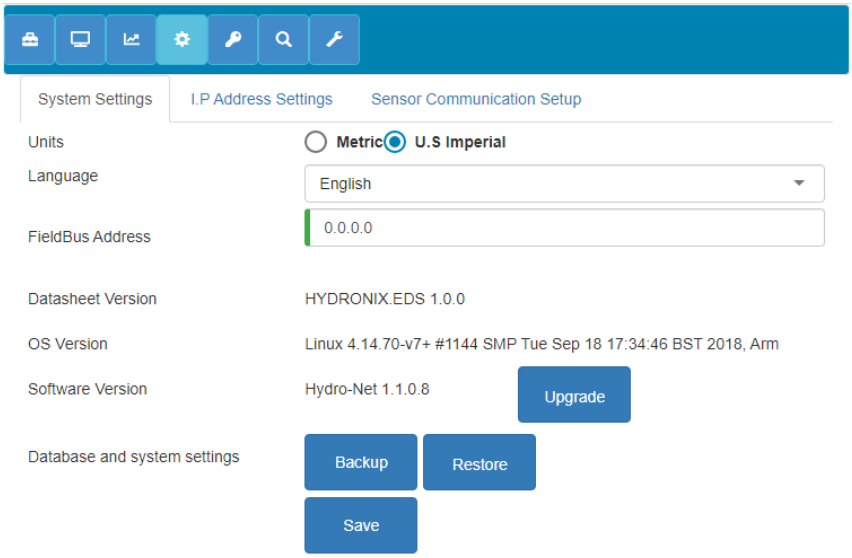


**Figure 11: Hydro-Hub EtherNet/IP Address**

To change the EtherNet/IP module's IP configuration enter the current IP address, shown in the 'Fieldbus Address' into a web browser (see Figure 12).

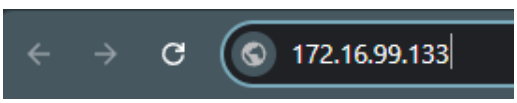


**Figure 12: Accessing the EtherNet/IP Module's Configuration Tool**

A notification field might pop up informing that the device does not support a secure connection; click the "Continue to site" button.

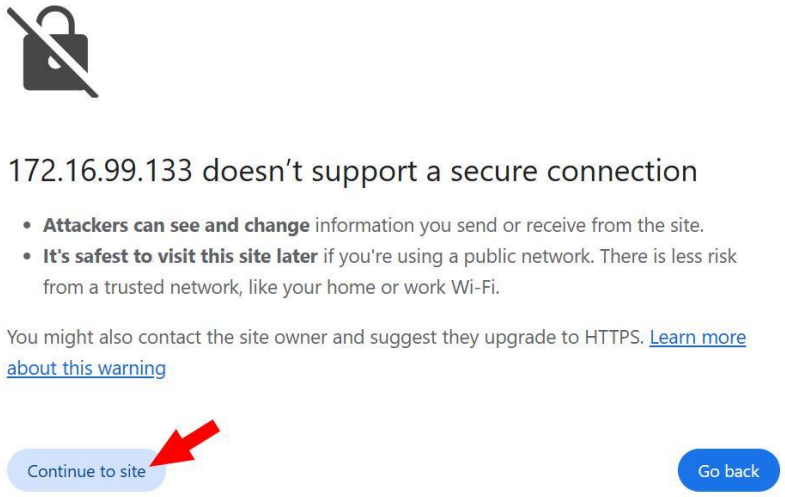


**Figure 13: Accessing the EtherNet/IP Module's Configuration Tool**

The browser will display the main screen of the configuration tool (see Figure 14).

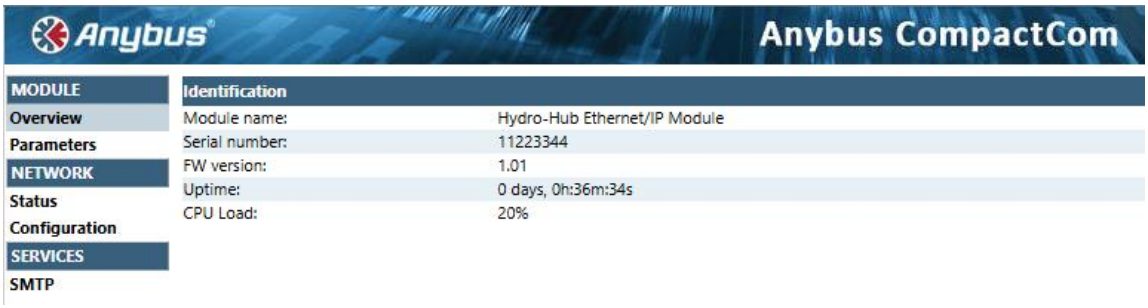


**Figure 14: EtherNet/IP Module's Configuration Tool Main Screen**

Click the "Configuration" button to enter the configuration page (arrow No 1 on Figure 15 ). Amend the IP details as required in the section pointed out by arrow No 2 and press the "Save settings" button (arrow No 3).

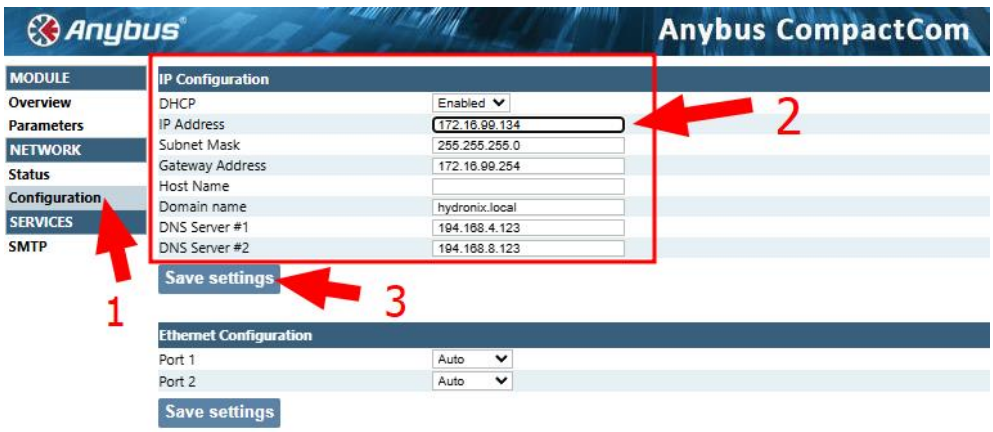


**Figure 15: EtherNet/IP Configuration Screen**

A prompt window will appear to confirm that the configuration was performed (see Figure 16). Press the OK button to accept.

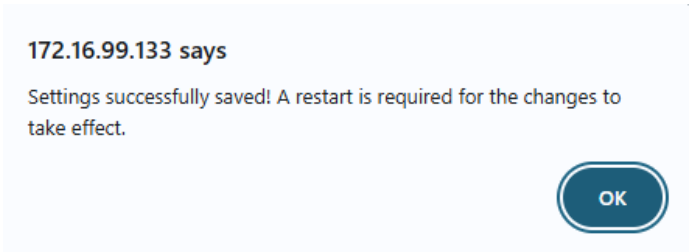


**Figure 16: Notification pop-up window**

Reboot the device for the changes to take effect. The new address of the EtherNet/IP module will be visible in the Fieldbus Address field on the System Settings screen.

After the Fieldbus address has been changed the Hydro-Hub must be powered down and then restarted. If the Hydro-Hub is connected to the network and the Scanner is configured correctly both lights on the Hydro-View EtherNet/IP module will be green.

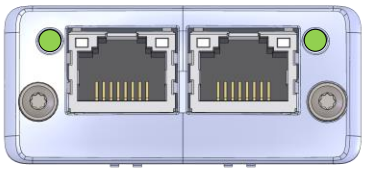

**Figure 17: Hydro-Hub EtherNet/IP Module Correctly Configured**

The Hydronix EtherNet/IP module must have a class 1 connection established to run. The connection configuration is as shown in Figure 18.

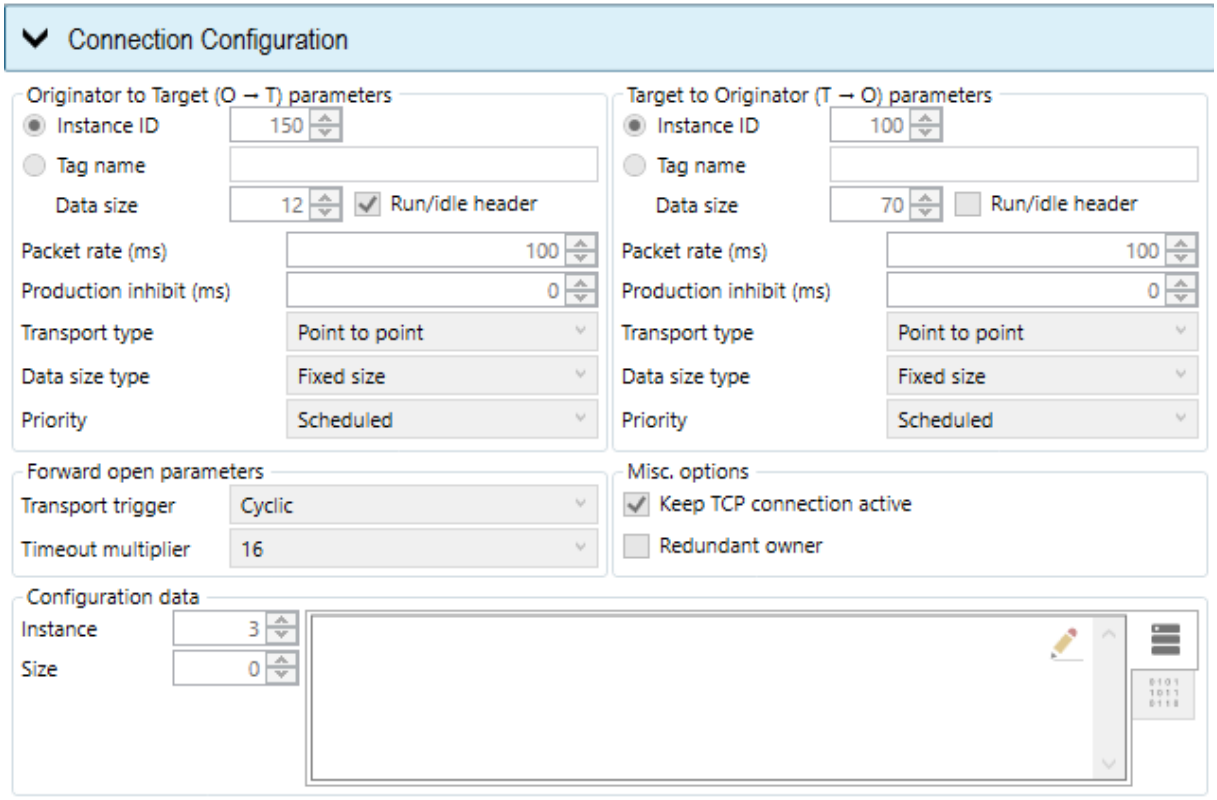


**Figure 18: Connection Configuration**

The I/O mappings are defined in **Table 1**

| Value | Input Bytes | Length In Bytes |
|---|---|---|
| Filtered Unscaled F | 0-3 | 4 |
| Filtered Unscaled V | 4-7 | 4 |
| Filtered Unscaled E | 8-11 | 4 |
| Filtered Moisture Mode F | 12-15 | 4 |
| Filtered Moisture Mode V | 16-19 | 4 |
| Filtered Moisture Mode E | 20-23 | 4 |
| Unscaled Average Mode F | 24-27 | 4 |
| Unscaled Average Mode V | 28-31 | 4 |
| Unscaled Average Mode E | 32-35 | 4 |
| Moisture Average Mode F | 36-39 | 4 |
| Moisture Average Mode V | 40-43 | 4 |
| Moisture Average Mode E | 44-47 | 4 |
| Electronics Temp | 48-51 | 4 |
| Resonator Temp | 52-55 | 4 |
| Material Temp | 56-59 | 4 |
| Digital Outputs | 60-61 | 2 |
| Averaging Status | 62-63 | 2 |
| Updated | 64-65 | 2 |
| Available Sensors | 66-67 | 2 |
| Search Status | 68-69 | 2 |
| **Value** | **Output Bytes** | **Length In Bytes** |
| Sensor Address | 0-1 | 2 |
| Update Values | 2-5 | 4 |
| Update Trigger | 6-7 | 2 |
| Activate Averaging | 8-9 | 2 |
| Search Network | 10-11 | 2 |

**Table 1: I/O Mapping**

The I/O data available using the Hydronix EtherNet/IP module is detailed in **Table 2**.

| Module Name | Input/ output | Data Type | Description | Data Range |
|---|---|---|---|---|
| Sensor Address | Output | Word | Node address of the Connected sensor | 1 to16<br>16#0001 to 16#0010 |
| Update Values | Output | DWord | Configures the Update Mode to enable reading of the Averaging Status and/or the Digital Outputs for each connected sensor | 16#0000_0000= None<br>16#0000_0001=Digital Outputs<br>16#0000_0002=Averaging Status<br>16#0000_0003=Both<br>**Sensor Address must be set to 16#0000 for this request to work** |
| Update Trigger | Output | Word | Update Trigger initiates a sensor update command | The Hydro-Hub will initiate the communication with a sensor whenever the Update Trigger value changes. (Positive Edge) |
| Activate | Output | Word | Activate the averaging | Each bit in the 16bit word will |

| | | | | |
|---|---|---|---|---|
| Averaging | | | in a single or multiple connected sensors | active the sensor with the corresponding node address (1-16)<br>**Sensor Address must be set to 16#0000 for this request to work** |
| Filtered Unscaled F | Input | DWord | Floating point Number 2 decimal place precision. Sensor output value “Filtered Unscaled Mode F” | |
| Filtered Unscaled V | Input | DWord | Floating point Number 2 decimal place precision. Sensor output value “Filtered Unscaled Mode V” | |
| Filtered Unscaled E | Input | DWord | Floating point Number 2 decimal place precision. Sensor output value “Filtered Unscaled Mode E” | |
| Filtered Moisture F | Input | DWord | Floating point Number 2 decimal place precision. Sensor output value “Filtered Moisture Mode F” | |
| Filtered Moisture V | Input | DWord | Floating point Number 2 decimal place precision. Sensor output value “Filtered Moisture Mode V” | |
| Filtered Moisture E | Input | DWord | Floating point Number 2 decimal place precision. Sensor output value “Filtered Moisture Mode E” | |
| Unscaled Average F | Input | DWord | Floating point Number 2 decimal place precision. Sensor output value “Average Unscaled Mode F” | |
| Unscaled Average V | Input | DWord | Floating point Number 2 decimal place precision. Sensor output value “Average Unscaled Mode V” | |

| | | | | |
|---|---|---|---|---|
| Unscaled Average E | Input | DWord | Floating point Number 2 decimal place precision. Sensor output value “Average Unscaled Mode E” | |
| Moisture Average F | Input | DWord | Floating point Number 2 decimal place precision. Sensor output value “Average Moisture Mode F” | |
| Moisture Average V | Input | DWord | Floating point Number 2 decimal place precision. Sensor output value “Average Moisture Mode V” | |
| Moisture Average E | Input | DWord | Floating point Number 2 decimal place precision. Sensor output value “Average Moisture Mode E” | |
| Electronics Temp | Input | DWord | Floating point Number 2 decimal place precision. Sensor output value “Electronic Temperature” | |
| Resonator Temp | Input | DWord | Floating point Number 2 decimal place precision. Sensor output value “Resonator Temperature” | |
| Material Temp | Input | DWord | Floating point Number 2 decimal place precision. Sensor output value “Material Temperature” | |
| Digital Outputs | Input | Word | Current status of the connected sensor(s) digital output | Each bit in the 16bit word will indicate the digital output status of the sensor with the corresponding node address (1-16) |
| Averaging Status | Input | Word | Averaging status of the connected sensors | Each bit in the 16bit word will indicate the averaging status of the sensor with the corresponding node address (1-16) |
| Updated | Input | Word | Updated is incremented when the Hydro-Hub has completed a message transaction | Rolling increment from:<br>16#0001 to 16#00FF<br>If an error has occurred Updated will be set as: 16#0000 |

| | | | | |
|---|---|---|---|---|
| Available Sensors | Input | Word | Current sensors available on the network | Each bit in the 16bit word represents a sensor node address (1-16) |
| Search Status | Input | Word | Indicates if a search of the sensor network is in progress | 0= No search in progress<br>1= Search in progress |
| Search Network | Output | Word | Start a search of the network | 1= Start Search<br>Increment the Trigger Word to initiate the search |

**Table 2: Hydronix EtherNet/IP Mapping**

# 1 Example Transactions

To retrieve data from a sensor, a Search Network command must be completed. A search of the network is automatically started when the Hydro-View/Hydro-Hub is switched on. If a new sensor is added to the network a new search, using the Hydro-View/Hydro-Hub, must be performed. Alternatively, the network can be searched using the Search Network command.

## 1.1 Search Network

To initiate a search of the sensor network, set “Search Network” to 1 and increment the “Update Trigger” word. During the search cycle the “Search Status” word will be set to 1. Once the search has completed the “Search Status” word will return to 0.

The available sensors on the network are indicated by the “Available Sensors” word. Each bit in the “Available Sensors” word is set if a sensor is available. Each bit represents a sensor node address (1-16). The LSB represents address 1.

The following message shows there are 5 sensors on the network. The available sensors have node address’: 1, 5, 9, 10 and 16.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |

## 1.2 Current Digital output status

To retrieve the current digital output status the “Sensor Address” output must be set to 0. The “Status Update Value” is set to 16#0000_0001 and the “Trigger” bit is incremented. Each bit of the 16bit “Digital Outputs” input is set to represent a sensor on the network based on the node address. The “Update Status” value will be incremented by 1 on completion of the request.

The following message indicates that the digital outputs on sensors 3, 12 and 16 are active.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |

## 1.3 Current Averaging Status

To retrieve the current “Averaging Status” of the sensors on the network the “Sensor Address” output must be set to 16#0000. “Update Values” is set to 16#0000_0002 and the “Update Trigger” bit is incremented. Each bit of the 16bit “Averaging Status” is set to represent a sensor

on the network based on the node address. The “Updated” value will be incremented by 1 on completion of the request.

The following message indicates that sensors 1, 2, 3 and 8 are currently averaging.

| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

## 1.4 Activate Averaging

To command a sensor to start averaging the “Sensor Address” output must be set to 16#0000. The averaging for a sensor is configured by setting the appropriate bit in the 16bit “Activate Averaging” output. The “Update Trigger” bit is then incremented. The “Updated” value will be incremented by 1 on completion of the request. The “Activate Averaging” message is sent every time the “Trigger” is incremented and the sensor address is also set to 0.

The following message will start averaging a sensor with a node address of 1.

| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

To stop averaging the previously active bit is set to 0 and the “Trigger” bit incremented.

| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

## 1.5 Sensor Live Values

To retrieve the current live values from a sensor the “Sensor Address” value must be set to match the sensor node address (Sensor Address 1 will be 0 in Output Byte 0 and 1). The command is activated by changing the value in the “Update Tigger” word. The “Updated” value will be incremented by 1 on completion of the request. “Updated” will roll over to 0 once a value of 255 is reached.

Live values are written to the input bytes shown in **Table 1**. To use these values it is necessary to copy the 4 bytes (SINT datatype) into a REAL datatype. This can be achieved using the COP function.

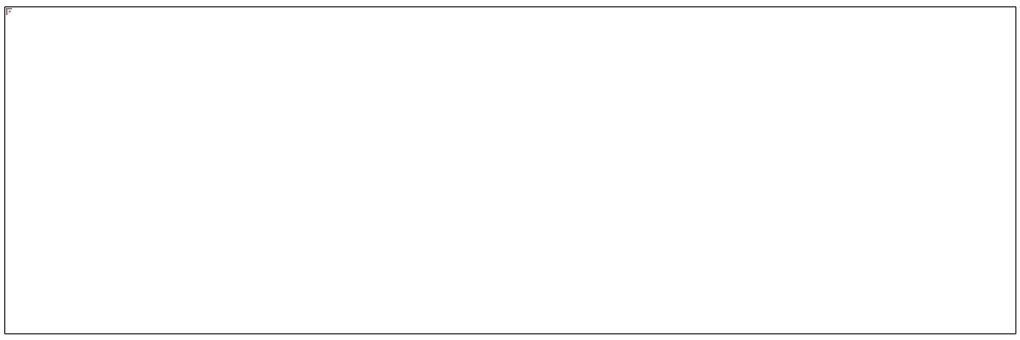

**Figure 19: Input Register**

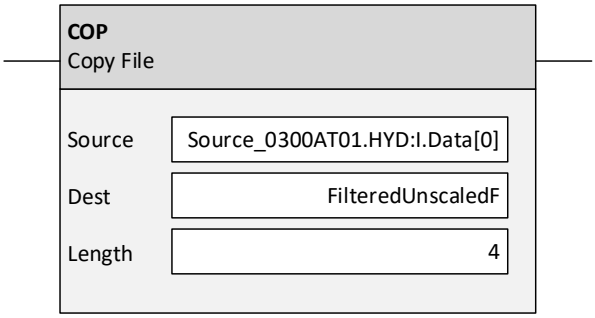


**Figure 20: Section of the Input Register**

Figure 19 shows part of the input register. **Table 1** shows that the Filtered Unscaled Mode F value is held in bytes 0-3. In the COP function shown in Figure 20 the register data is copied to a REAL variable named 'FilteredUnscaledF'. The length is 4 bytes

# 1 Document Cross Reference

This section lists all of the other documents that are referred to in this User Guide. You may find it beneficial to have a copy available when reading to this guide.

| Document Number | Title |
|---|---|
| HD0864 | Hydro-View / Hydro-Hub User Guide |
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